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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/533,591	03/23/2000	Jung Chuan Chou	H000010	1107

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EXAMINER
ORTIZ, EDGARDO

ART UNIT	PAPER NUMBER
2815	

DATE MAILED: 06/19/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.	Applicant(s)
09/533,591	Chou Et.al.
Examiner	**Art Unit**
Edgardo Ortiz	2815

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on *Apr 10, 2002* .

2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) *1-11* is/are pending in the application.

4a) Of the above, claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) *1-11* is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on _____ is/are a) ☐ accepted or b) ☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) ☐ All b) ☐ Some* c) ☐ None of:

1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

*See the attached detailed Office action for a list of the certified copies not received.

14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

a) ☐ The translation of the foreign language provisional application has been received.

15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s). _____
4) ☐ Interview Summary (PTO-413) Paper No(s). _____
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

This Office Action is in response to a response filed April 10, 2002.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-11 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Covington et.al. (U.S. Patent No. 4,502,938) in view of Gardner et.al. (U.S. Patent No. 6,121,094). With regard to Claim 1, Covington teaches a semiconductor substrate (3), a gate oxide layer (6) on the semiconductor substrate, an ion-selective membrane layer overlying the gate oxide layer, a source/drain (1, 2) in the semiconductor substrate beside the ion-selective membrane layer, a metal wire on the source/drain and a sealing layer (11) overlying the metal wire and exposing the ion-selective membrane layer.

However, Covington fails to teach a tungsten oxide layer which overlies the gate oxide layer in the gate structure. Gardner teaches a multi-level gate structure including a gate oxide layer (18) with an overlying tungsten oxide layer (32). Therefore, it would have been an obvious modification to someone with ordinary skill in the art, at the time of the invention, to modify the

Covington structure to include a tungsten oxide layer which overlies the gate oxide layer in the gate structure, as taught by Gardner, in order to allow metal conductor layers to adhere properly to underlying process layers and reduce delamination.

With regard to Claim 2, a further difference between the claimed invention and the teachings of Covington and Gardner is, the length, width and width/length ratio of the channel region. It would have been an obvious modification at the time of the invention, to modify the structure as taught by Covington and Gardner to include the claimed dimensions, in order to provide a channel region which reduces the source-to-drain capacitance.

With regard to Claim 3, a further difference between the claimed invention and the teachings of Covington and Gardner is, a semiconductor substrate being P-type. It would have been an obvious modification at the time of the invention, to modify the structure as taught by Covington and Gardner to include a semiconductor substrate being P-type, since it is a well-known practice in the art to provide a semiconductor substrate with a specific polarity depending on its use or function.

With regard to Claim 4, a further difference between the claimed invention and the teachings of Covington and Gardner is, a semiconductor substrate having a resistivity of 8 to 12 ohms-cm. It would have been an obvious modification at the time of the invention, to modify the structure as

taught by Covington and Gardner to include a semiconductor substrate having a resistivity of 8 to 12 ohms-cm, based on the dopant and the polarity of the material used for the semiconductor substrate.

With regard to Claim 5, Covington teaches a semiconductor with a lattice parameter of (1,0,0).

With regard to Claim 6, Covington fails to teach a gate oxide having a thickness of about 1000Å. Gardner teaches a gate oxide having a thickness of about 1000Å. Therefore, it would have been an obvious modification at the time of the invention, to modify the structure as taught by Covington to include a gate oxide having a thickness of about 1000Å , as taught by Gardner, in order to provide a proper gate oxide based on the dielectric constant of the metal oxide used in the gate structure.

With regard to Claim 7, Covington fails to teach a thickness of a tungsten oxide layer that is at least 1000Å. Gardner teaches a tungsten oxide layer that has a thickness which is variable depending on the specific application. Therefore, it would have been an obvious modification at the time of the invention, to modify the structure as taught by Covington to include a tungsten oxide layer that is at least 1000Å, as taught by Gardner, in order to provide a tungsten oxide layer with the thickness required depending on a specific application.

With regard to Claim 8, Covington teaches a metal wire consisting of Al.

With regard to Claim 9, Covington teaches a sealing layer consisting of epoxide resin.

With regard to Claim 10, a further difference between the claimed invention and the teachings of Covington and Gardner is, a source/drain being N-type. It would have been an obvious modification at the time of the invention, to modify the structure as taught by Covington and Gardner to include a source/drain being N-type, since it is a well-known practice in the art to provide a source/drain with a specific polarity depending on its use or function.

With regard to Claim 11, a further difference between the claimed invention and the teachings of Covington and Gardner is, N-type impurities consisting of phosphorous. It would have been an obvious modification at the time of the invention, to modify the structure as taught by Covington and Gardner to include N-type impurities consisting of phosphorous, since it is a well-known practice in the art to provide a source/drain with a Group-V dopant in order to provide an N-type active region.

Response to Arguments

2. Applicant's arguments filed on April 10, 2002 have been fully considered but are not deemed persuasive for the reasons stated in the body of the office action. Applicant argues, regarding the rejection of claims 1, that the teachings of Gardner fail to suggest an amorphous-tungsten oxide (a-WO3) layer as th sensing membrane. The examiner disagrees, and notes that Gardner, as stated supra, Gardner teaches a multi-level gate structure including a gate oxide layer (18) with an overlying tungsten oxide layer (32). Gardner teaches (column 6, lines 53-56) that the thickness of the metal oxide layer and the material used for the metal oxide layer are matters of design choice that may vary depending upon specific application requirements or objectives. Therefore, the tungsten oxide layer taught by Gardner can be of an amorphous or crystalline nature, depending on the use. Additionally, it is noted that on Applicant's own specification (page 5, lines 9-12) states that "The composition of the WO3 layer and its properties vary with the selected method and condition during preparing the WO3 layer. Most of the WO3 layers are amorphous, polycristalline or crystalline". Applicant also states on his remarks that "It is known that WO3 takes form of several structures, and within the various structures of the WO3, different physical and chemical properties in terms of, e.g. resistivity and conductivity are present". Furthermore, Applicant argues that neither Covington nor Gardner suggest using an a-WO3 layer as the sensing membrane of the ISFET. It is noted that the test for combining references is what the combination of disclosures taken as a whole would suggest to one of ordinary skill in the art and that references are evaluated by what they suggest to one versed in the art, rather than by

their specific disclosures. The teachings of Covington and Gardner clearly suggest the claimed invention, as disclosed on claim 1. Lastly, Applicant argues regarding the rejection of dependent claims 2-11, that Covington and Gardner fail to teach or suggest the limitations included on claims. The examiner disagrees and refers Applicant to the reasons stated in the body of the office action to reject these claims. Therefore, the claimed invention does not structurally or patentably distinguish from that taught by the prior art and the rejection is maintained.

Conclusion

4. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Edgardo Ortiz (Art Unit 2815), whose telephone number is (703) 308-6183 or by fax at (703) 308-7724. In case the Examiner can not be reached through a direct telephone call, you might call Supervisor Eddie Lee at (703) 308-1690. Any inquiry of a general nature or relating to the status of this application should be directed to the Group 2800 receptionist whose telephone number is (703) 308-0956.

EO / AU 2815

6/18/02

EDDIE LEE
SUPERVISORY PATENT EXAMINER
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